

# UNIVERSITY OF CALIFORNIA.

## AGRICULTURAL EXPERIMENT STATION.

BULLETIN NO. 59.

The experimental vineyard-plot at Cupertino, placed at the disposal of the University by Mr. John T. Doyle, two years ago, has this season borne its first available crop, and samples of most of the grape varieties have been shipped to the University Viticultural Laboratory for experimental vinification, to the number of 36. Of some of these, samples have been gathered and fermented at two different times, to determine the peculiarities at the several degrees of maturity, and the rate of increase of sugar. As is well known, the sugar percentages have generally been low this season, so that a good opportunity was afforded for observing those varieties which will yield a proper saccharine strength even under adverse circumstances.

The detailed record and discussion of these results will be found in the report of viticultural work for 1886, now in press at the State printing office. But it will be of general interest to give in advance, at this time, when the choice of vines to be newly planted or grafted is being made by grape-growers, the record of the actual product of the several varieties, which has been kept by Mr. John J. Doyle, the manager of the Cupertino vineyard, for all the more important varieties, his leisure not allowing the extension of the observation over the whole of the collection.

### Character of the Soil.

The University tract being practically level, and its soil of remarkable uniformity, it will show characteristically the differences between the grapes and wines of the several varieties, being in this respect parallel to the case of Mr. H. W. Crabb, a comparison of whose varied wines is given in the report of the work for 1885, page 70. Moreover, the soil being a very much generalized one for the west side of the Santa Clara valley, the points elicited will be applicable to a large region, from the neighborhood of Mountain View to that of New Almaden.

The land on which this tract is located forms part of the gently undulating valley slope that lies between the Santa Clara valley proper and the Coast Range, and into the higher part of

which Cupertino creek and its branches have cut narrow and deep, abrupt valleys. The experimental plot assigned to the University lies immediately adjacent to the valley of the main Cupertino on the west and about 50 feet above it. The soil is a drab-tinted clay loam, largely intermixed with gravel and rock fragments, showing the whole to consist of the wash from the adjacent and other ranges lying toward New Almaden. In the bluff banks that fall off steeply into the creek bottom it can readily be seen that the same material, only with larger proportions of gravel, and yellow instead of a drab-colored loam, extends down nearly to the creek level. It is perfectly penetrable by both water and roots, the latter being seen in it at levels from 12 to even 20 feet below the trees and vines to which they belong. The land is therefore perfectly underdrained and thus fulfills one essential condition of first-class wine-grape land. It is, of course, easily workable soon after rains.

In order to obtain a full insight into the nature of the soil and subsoil, a trench 6 feet deep was dug in what might be considered a representative spot of the tract, and the soil material was sampled for each 12 inches from the surface, so as to obtain fair specimens. Three of these—viz.: 0 to 12 inches, 12 to 24 inches, and 5 to 6 feet—were fully analyzed chemically, as reported below; and as these analyses are sufficient to show both the general character and the rate and character of change downward, the samples representing the other intervals received only a physical examination. From about 30 to 36 inches below the surface there is usually a noticeable change of tint toward the yellow, and an obvious increase of the gravelly ingredients, which is apparent in the wide difference in the percentage of "fine earth," in the table below, between the immediate subsoil 12 to 24 inches depth, and the sample taken from the interval 36 to 48 inches, the latter containing less than one-fourth as much of soil matter proper than the former. But it is also seen that from 36 down to 72 inches the soil percentage remains almost the same, and judging from the aspect of the bank where the level land breaks off into the valley, the same might be true to the depth of 10 or 12 feet, if not more.



re-stated. The vineyard plot of which the use is granted the University, consisted originally ANALYSES OF SOILS AND SUBSOILS FROM UNIVERSITY VINEYARD PLOT, CUPERTINO.

	No. 986.	No. 987.	No. 989.	No. 991.
	Soil, 0 to 12 in.	Sub-soil, 12 to 24 in.	Under-subsoil, 36 to 48 in.	Under-subsoil, 60 to 72 in.
Coarse Gravel..	30.3	37.5	35.2	73.0
Fine gravel and sand.....				
Fine earth.....				
	69.7	62.5	54.8	13.5
	100.0	100.0	100.0	100.0

#### ANALYSES OF FINE EARTH.

	No. 986.	No. 987.	No. 991.
	Soil, 0 to 12 in.	Sub-soil, 12 to 24 in.	Under-subsoil, 60 to 72 in.
Insoluble matter.....	73.63	71.43	65.54
Soluble silica.....	6.25	7.98	9.74
Potash.....	.60	.63	.79
Soda.....	.03	.14	.03
Lime.....	1.44	1.59	1.29
Magnesia.....	1.36	1.53	1.88
Br. ox. of manganese...	.02	.01	.01
Peroxide of iron.....	6.68	6.75	7.58
Alumina.....	5.43	5.72	8.58
Phosphoric acid.....	.10	.08	.11
Sulphuric acid.....	.01	.01	.01
Water a'd organic matter	4.30	3.96	4.65
Total.....	69.84	99.82	100.22
Humus.....	.96	....	....
Available inorganic.....	1.64	....	....
Hygrosopic moisture absorbed at 15 deg. C.	5.14	5.13	8.05

It will be noted that notwithstanding the wide differences in the mechanical composition of the materials analyzed, they do not differ materially in the general composition of the fine earth; although there is a manifest increase downward of several of the ingredients. The potash supply is from good to high, the lowest material having one-fourth more than the surface soil. The lime percentage is good in all, but decreases slightly in the lowest material, while the magnesia increases steadily downward. Phosphoric acid is practically probably the same throughout, and is in fair supply; sulphuric acid is low throughout, and might advantageously be raised by the aid of plaster. Humus in the surface soil shows a fair percentage, perhaps as large as so pervious a soil will maintain in the local climate. The moisture-absorption reaches a very satisfactory figure, and increases downward, parallel with a greater heaviness of the soil, as is shown by the increase of the item of alumina, the characteristic ingredient of clay.

Altogether the soil is a very fine one for vineyard purposes, both as to its mechanical and chemical composition; and considering the great depth to which roots can readily penetrate it, it promises high durability. It is, moreover, so "generalized" in its character as to render the results obtained on it of wide applicability.

#### Product of the Vines.

In order that the conditions under which these results were obtained may be fully understood, the history of the vines in this plot, already given in the report for 1886, should be

of 37 rows, eight feet apart, of 40 vines each, the latter being, at the time, three-year-old Zinfandels. These were, in 1884, grafted to the following varieties of wine grapes:

Grossblau,	Herbement,
Crabb's Burgundy,	Franken Riesling,
"Portals' Ploussard,"	Pizzutello di Roma,
Gamay Teinturier (Crabb)	Chausche Gris,
Barbera,	Sauvignon Vert
Nebbiolo, 2 varieties,	Johannisberg Riesling,
Malbeck,	West's White Prolific,
Verdot,	Kleinberger (True Burger)
Meunier,	Chasselas Fountainebleau,
Cabernet Franc,	Semillon,
Petite Sirah,	"Golden Chasselas,"
Ploussard,	Burger,
Chausche Noir,	Seedless Sultana,
Fresa (Monfra),	Muskateller,
Black Hamburg,	Huasco Muscat,
Barbarossa,	Lignanza,
Teinturier Male,	Alexandria Muscat,
West's St. Peters (?),	Pinot St. George.

Most of the grafts took well, and those which had not were mostly regrafted to the same varieties in 1885. It was expected that in that year at least a small crop would be obtained from them, but the season being so universally unfavorable, the product was too small to serve for more than an identification of varieties in doubtful cases.

This season, 1886, all the vines were pruned long, three canes, and trained on stakes, so as to insure an adequate crop for experimental winemaking. This point must of course be taken into consideration in judging of the results, since short-pruning varieties would thus naturally overbear and show a heavier crop than that which they could be permanently charged without greatly shortening their lives.

The following table shows, in the last column, the average product, in pounds, of the vines sampled, the number from which this average is deduced being given in the first column, while the middle one gives the total product of all:

#### PRODUCT OF VINES IN UNIVERSITY EXPERIMENTAL PLOT AT CUPERTINO, SANTA CLARA CO.

Variety.	No. of Vines.	Total Weight of Grapes.	Average for Each Vine.
Nebbiolo.....	20	650	32.5
Fresa.....	7	200	28.5
Black Hamburg.....	40	1050	26.2
Franken Riesling.....	20	686	34.3
Grossblau.....	20	685	34.2
Crabb's Black Burgundy.....	20	404	20.2
Chausche Gris.....	20	853	42.6
Gamay Teinturier.....	20	596	29.8
Malbeck.....	20	253	12.6
"Portals' Ploussard" (Malbeck)	20	247	12.3
Meunier.....	20	510	25.5
Sauvignon Vert.....	20	1037	51.8
Folle Blanche.....	20	765	38.2
Johannisberger Riesling.....	20	309	15.4
Herbement.....	20	658	32.9
West's White Prolific.....	33	1953	59.1
West's St. Peter's (?).....	20	345	17.2
Cabernet Franc.....	20	425	21.2
Teinturier.....	20	440	22
Sirah.....	14	430	30.7
Kleinberger.....	20	1000	50
Ploussard (proper).....	20	881	44
Chasselas de Fontainebleau.....	20	1412	70.6
Semillon.....	20	750	37.5
Barbarossa.....	13	991	76
Gros Verdot.....	7	555	79.2
Palomino ("Gold'n Chasselas")	28	1605	57.3
Zinfandel (?).....	18	1145	63.6
Burger.....	32	1884	58.8
Sultana.....	7	487	72.4
Chausche Noir.....	7	457	65



It will be seen that the highest product of this list is that of the Gros Verdot, which gave nearly 80 pounds to the vine. This figure may require to be discounted to some extent, from the fact that it is an average of only seven vines, which were picked out from the somewhat mixed row of which it is intended to form the sole ingredient. Making all allowances, however, the Verdot must be classed as a very prolific vine. It will be interesting to see what is the quality of the wine resulting from such heavy bearing.

Immediately below it, but still in the seventies, we find the Barbarossa, Chasselas de Fontainebleau, Palomino and Sultana. Of these the latter is usually supposed to be capable of bearing the heaviest crops, but it is evident that on this soil at least, the two others are even with it.

Ranging close to the sixties we find the Zinfandel, Chauche Noir, Burger, Palomino and West's White Prolific.

Close to the fifties are the Sauvignon Vert and the Kleinberger, or True Burger.

Close to the forties are the True Ploussard, Chauche Gris and the Semillon. The latter, as so prolific a bearer, will agreeably surprise some of those who have hesitated about planting this noble grape. The Ploussard, likewise, is a high-grade grape which thus shows its claim to attention.

Near the thirties, we have the Sirah, Nebbiolo, Fresa, Franken Riesling, Grossblau, Gamay Teinturier, Herbemont, Meunier, Black Hamburg.

Near the twenties, Crabb's Black Burgundy, West's St. Peter's, Teinturier Male.

Between 20 and 12, the Johannisberger Riesling, and Malbeck, including "Portal's Ploussard," which is undoubtedly identical with the Malbeck of the University plot, Krug's direct importation.

The low figure for Malbeck will be a disappointment to many who would like to cultivate this desirable variety. To these might be said, what is true of the entire series here recorded, that what is true at Cupertino may not hold good elsewhere on different soils, and also that of the several sub-varieties of the Malbeck,

some may be found more prolific even at Cupertino, hereafter; also that vines of greater age may bear more abundantly.

As to the Riesling, its low product will disappoint no one; it is in accord with experience on soils to which it is adapted, although on valley soils it may be forced into heavier bearing with a corresponding reduction in quality.

It will, of course, require the experience of several years to obtain a reliable average of the bearing of these several varieties, even on this particular soil. Still, the season of 1886 was in general a good one, except in the case of particular varieties badly affected by *coulure*. From the record on the latter subject made by Mr. F. W. Morse, with respect to the grapes received from Cupertino, it does not appear that either the Malbeck or the Riesling was materially affected by *coulure* this season. A detailed account of the discussion of this point will be given in the forthcoming report.

In view of the numerous additional grape varieties that have come into notice since 1884, and deserve exact comparison in respect to their adaptation and merits in the Cupertino region, Mr. Doyle has added to the list above given, by grafting on five-year-old Zinfandel stocks, the following:

Isabella Regia,	Cinsaut,
Howland's Black Hamburg,	Petit Verdot,
Black Prince,	Bastardo,
Grape of Almeria,	Mourastel,
Semillon,	Pedro Jimenes,
Pinot Vert d'Orci,	Verdelho,
Canon Hall Muscat,	Palomino,
Ugni Blanc,	Tinta Amarella,
Franc Pinot,	Merlot,
Noirien,	Gros Mancin,
Pinot de Pernand,	Aramon,
Pinot Blanc Chardonay,	Serine,
Mondeuse,	Tinta Cao,
	Tinta Madeira.

Still further additions to the collection are contemplated for the coming season, so that, including the varieties constituting Mr. Doyle's large vineyard, nearly 100 will be represented in 1887.

E. W. HILGARD.

Berkeley, Nov. 26, 1886.